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DOCUMENT-IDENTIFIER: US 20020164877 A1
TITLE: Process for forming metal-filled openings in low dielectric constant dielectric material while inhibiting via poisoning

Summary of Invention Paragraph (6):
[0005] In an article by L. Peters, entitled "Pursuing the Perfect Low-K Dielectric", published in Semiconductor International, Volume 21, No. 10, Sep. 1998, at pages 64-74, a number of alternate dielectric materials are disclosed and discussed. Included in these dielectric materials is a description of a low k dielectric material having a dielectric constant of about 3.0 formed using a Flowfill chemical vapor deposition (CVD) process developed by Trikon Technologies of Newport, Gwent, U.K. The process is said to react methyl silane (CH.sub.3--SiH.sub.3) with hydrogen peroxide (H.sub.2O.sub.2) to form monosilicic acid which condenses on a cool wafer and is converted into an amorphous methyl-doped silicon oxide which is annealed at 400.degree. C. to remove moisture. The article goes on to state that beyond methyl silane, studies show a possible k of 2.75 using dimethyl silane in the Flowfill process.

Summary of Invention Paragraph (7):
[0006] An article by S. McClatchie et al. entitled "Low Dielectric Constant Oxide Films Deposited Using CVD Techniques", published in the 1998 Proceedings of the Fourth International Dielectrics For ULSI Multilevel Interconnection Conference (Dumic) held on Feb. 16-17, 1998 at Santa Clara, Calif., at pages 311-318, also describes the formation of methyl-doped silicon oxide by the low-k Flowfill process of reacting methyl silane with H.sub.2O.sub.2 to achieve a dielectric constant of .about.2.9.

Summary of Invention Paragraph (10):
[0009] Various approaches have been explored to attempt to solve this problem of via "poisoning". Zukharev et al. U.S. Pat. 6,114,259, assigned to the assignee of this invention, and the subject matter of which is hereby incorporated by reference, teaches treating the etched via sidewalls of the low k carbon-doped silicon oxide dielectric material with a nitrogen plasma, or a nitrogen and oxygen plasma, to densify the exposed low k carbon-doped silicon oxide dielectric material. The Zukharev et al. patent further teaches removal of the photoresist mask used to form the openings with a mild oxidizing agent comprising an H.sub.2O plasma. The H.sub.2O plasma removes the resist mask without damaging the exposed low k carbon-doped silicon oxide dielectric material comprising the sidewalls of the etched via sufficiently to interfere with later filling of the via with an electrically conductive metal filler.